

ABSTRACTS (alphabetical by presenter, in bold)

John Baroch, Genesis Laboratories, Inc., P.O. Box 1149, Wellington, CO 80549 USA

Historical Perspectives and Current Ecological Impacts of Nutria in Louisiana

The nutria or coypu (*Myocastor coypus*) is a rodent native to South America that has been introduced almost worldwide since the early 1900's, originally with the intent of fur farming in many cases. The nutria is a large (over 6 kg), semi-aquatic rodent with a voracious appetite and high reproductive potential. Nutria became established in the Louisiana wetlands in the 1930's. The habitat proved to be ideal and populations exploded, reaching an estimated 20 million animals in less than 20 years. Trapping of nutria for their pelts formed the backbone of the Louisiana fur trade from the 1960's until the early 1980's when prices for furs on the world market and in Louisiana plummeted. Since then the annual trapping harvest, which was over one million animals per year for many years, has dwindled to 29,544 in the 2000-2001 season and nutria numbers have increased dramatically. Reports of nutria damage to wetland habitats emerged in the late 1980's. Numerous studies of the wetland environments of Louisiana since then have documented the deleterious effects nutria over-grazing can have on the habitat. Ecologically, nutria are an important prey item for the alligator, but effects of nutria activity on other animals are primarily negative. Their most important impact is habitat modification and in many cases, habitat destruction. When impacts of intense nutria herbivory are added to the abiotic forces that are degrading the Louisiana coastal marshes the potential for lasting loss of wetland area is magnified. This presentation reviews the chronology of nutria establishment in Louisiana and historic population trends; interaction of nutria with other animals in the coastal marshes, and impacts of nutria herbivory on the wetland plant communities.

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David Bergman, USDA/APHIS, Wildlife Services, 8836 N 23 Avenue, Suite 2, Phoenix, AZ 85021 USA; Dale Nolte, USDA/APHIS, Wildlife Services, National Wildlife Research Center, Olympia Field Station, 9730-B Lathrop Industrial Drive SW, Olympia, WA 98512 USA; John Townsend, Maricopa County, Environmental Services, Vector Control, 3343 W. Durango, #3911, Phoenix, AZ 85009 USA

Urban Desert Islands: Can They Support an Invasion of Roof Rats?

Unsuccessful outbreaks of roof rats (*Rattus rattus*) have occurred in Arizona since the late 1800s. During 2001, the Maricopa County Environmental Services Department verified the latest outbreak in Phoenix, Arizona. Although the desert surrounding Phoenix is formidable to roof rats, residential and urban development has probably sufficiently altered habitat to render it habitable for roof rats. Ongoing community and government campaigns are reducing resources necessary for rat survival and are working to suppress rat populations. Whether these efforts will be adequate to eradicate roof rats from the area is unknown. Rat activity has declined over the last several months. However, it is difficult to assess whether this reduced activity reflects decreased rat numbers or if rats have become less active during the summer heat.

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Jeff N. Borchert, Genesis Laboratories, Inc., P.O. Box 1149, Wellington, CO 80549 USA

Flea Control on Wild Rodents

The control of plague has historically focused on the control of the rodent host and its associated fleas. Currently, the most common method of flea control on wild rodents is performed by the use of insecticidal dusts placed at the mouth of burrow. Genesis Laboratories evaluated systemic insecticides added to rodent baits for their potential to control the fleas of rodents. This talk summarizes these laboratory evaluations of insecticides. In the future, host targeted systemic insecticides of this nature incorporated into rodent baits offer a possible means of flea control on wild rodents.

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Keith Broome, New Zealand Department of Conservation, PO Box 112, Hamilton, New Zealand

An Overview of Rodent Control to Protect Biodiversity on Mainland New Zealand

NZ has some of the world's longest lists of human induced extinctions and threatened species due to habitat loss and a range of invasive pests. We consider mainland NZ as the two largest islands 'North' & 'South' where three rat and one mouse species exist. Rodents are ubiquitous in most mainland habitats with ship rats (*Rattus rattus*) and mice (*Mus musculus*) most important today. Other species (*R. norvegicus*, *R. exulans*) were historically significant in their impact and continue to be dominant on some smaller islands where one or more species are absent. Complex and dynamic predator-prey relationships exist and the full impact of rodent introductions is yet to come. Mainland rodent control strategies usually set management targets of low ship rat densities over bird breeding seasons and must be integrated with other pest control. Recently we have accepted the new challenge of managing the impacts of episodic irruptions of rodents threatening critically endangered species. Techniques include a range of pesticides and kill traps. Success at small and medium scales from well planned and supported programmes has drastically improved the status of some threatened species and increased bird populations generally at those sites. Many challenges exist to sustaining these successes, increasing the scale, and providing year-round protection to more vulnerable fauna. Some novel strategies are emerging to meet these challenges as well as continued refinement of existing techniques and research to grow our understanding of the issues.

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Keith Broome, New Zealand Department of Conservation, PO Box 112, Hamilton, New Zealand; [Penny Fisher](#), Landcare Research, PO Box 69, Lincoln, New Zealand

Risk Assessment of Rodenticide Use in New Zealand: An Overview

Broad-scale field application of vertebrate pesticides in NZ is internationally conspicuous. However the risks of such activities are not taken lightly. Use patterns reflect a balance between managing the severe impacts of invasive species on unique biodiversity and agricultural values, and the adverse effects of management techniques. An ongoing and rigorous regulatory framework governing the use of hazardous substances, including vertebrate pesticides, has recently been upgraded. The multi-tiered system identifies and manages risks from manufacture to disposal. Two Central Government bodies are involved in authorising products for sale in NZ. The Environmental Risk Management Authority focuses on environmental risks of all hazardous substances and new organisms. Their risk assessment approach uses recognised (Global Harmonisation) criteria, classifying substances and applying risk management controls. The Agricultural Compounds & Veterinary Medicines group of the NZ Food Safety Authority is focused on food residue risks, export food quality and animal welfare risks. Again the assessment process uses risk classification to trigger management controls. Any vertebrate pesticide on the market will be authorised by these two agencies and carry mandatory controls to manage their designated risk areas. Regional Government and Health authorities play a part in authorising field use of these products, sometimes case by case using information from an assessment of environmental effects. Such permissions typically come with risk management and environmental monitoring controls. For less hazardous products or methods, general permission is granted for specified activities subject to standard controls stated in Regional plans. In addition to these regulatory systems, the Department of Conservation (DOC) has a risk assessment process to further support safe field use of vertebrate pesticides on public conservation land. This system considers a range of risk categories and pragmatically scores both risk and uncertainty for each against a consistent framework. Risk scores exceeding thresholds generate controls or may prohibit use on land administered by DOC. High uncertainty scores demand further information gathering. Permission to use pesticides on public conservation land is always on a case by case basis, often requiring an assessment of environmental effects. Authorising managers use the DOC risk assessment as a platform and add any further controls necessary to manage risks associated with particular sites.

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Alan Buckle, University of Reading, Wendlesworth, Elsted Road, South Harting, Petersfield, Hampshire, GU31 5LR United Kingdom

Rodents on Oceanic Islands: Impacts and Management

Since the earliest days of exploration humans have accidentally, and sometimes purposefully, introduced rodents (mainly Norway rats, *Rattus norvegicus*; ship or black rats, *Rattus rattus*, and Polynesian rats, *Rattus exulans*) to places where they have landed and colonised. On the islands, the rodents preyed upon species poorly adapted to withstand their depredations. The full extent of this disaster on the biodiversity of the world's oceanic islands will never be known but in two recent cases, Lord Howe Island and Big South Cape Island, ornithologists were able to record the rodents' catastrophic impact on the islands' avifauna. Many species were extinguished and populations of others decreased dramatically. Thanks to the development of a range of management techniques, mainly pioneered by workers from New Zealand, conservationists now have an ability either to remove alien rodents from islands or, if this is impractical, to control rodents in particularly sensitive areas to allow endangered species a chance to recover.

Zino's Petrel breeds in burrows on cliff ledges among the peaks of Madeira's central mountain range. During the mid-1980s, it was found that the birds had failed to breed successfully for several years and that rats, coming up from the forests below, had infested the breeding ledges. The site was surveyed and, after detailed planning which included environmental impact assessment, a rodent control programme was initiated to protect the birds. This involved the placement of specially-designed rodenticide bait boxes, both in a 'cordon sanitaire' around the breeding ledges and on the ledges themselves. The difficult work of maintaining this programme has continued every year since thanks to the efforts of the Freira Conservation Project and the Natural Park of Madeira. Breeding was at first slow to re-establish but has improved in recent years, with a record in 2003 when over 20 chicks fledged.

Different problems faced the workers of the Natural Park of Madeira on Great Salvage Island, 160 nautical miles south of the Madeira mainland. The island was overrun with rabbits (*Oryctolagus cuniculi*) and house mice (*Mus* spp.). A project was initiated in 2002, aimed at the complete eradication of these species from the 240-ha island, in order to protect breeding seabirds. The island is a breeding station for globally important colonies of the White-faced Storm-petrel (*Pelagodroma marina*), Madeiran Storm-petrel (*Oceanodroma castro*), Bulwer's Petrel (*Bulweria bulwerii*), Little Shearwater (*Puffinus assimilis*) and Cory's Shearwater (*Calonectris diomedea*). Once again, severe difficulties of planning and logistics were overcome to establish and maintain a grid of rodenticide baiting stations over the entire island for more than a year. The rabbits were quickly removed and careful surveys in November 2003 failed to discover any signs of mice. The final outcome of the project, which also involved scientists from the UK Forestry Commission and the University of Reading, is eagerly awaited.

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Earl Campbell, USDI Fish and Wildlife Service, PO Box 50088, Honolulu, HI 96850 USA

Invasive Species: Bringing it Down to Rodents

Issues related to invasive species control in the North America are not a new topic. Man has been introducing species to this continent as pathways and rates of introduction have increased over time. Among vertebrates, the historic introduction of new rodent species within the United States and to its insular Territories and Possessions has had significant effects on human health, agriculture, and natural resources. Rodent control has traditionally focused on human health and agricultural issues, but in recent years, tools for rodent control have been applied in conservation situations. This presentation is intended to give background information to participants of the conference on current issues related to the control on non-native rodents in the United States. It is intended to link background information with new ideas and efforts that will be themes of this meeting and, finally, it will suggest new directions that may assist in the management of introduced rodents.

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Felipe Cano, USDA Caribbean National Forest, HC01 PO Box 13490, Rio Grande 00745-9625 Puerto Rico

Improving the Management of Rat Control Damage on the Caribbean National Forest

The USDA Caribbean National Forest (CNF) in Puerto Rico contains world-class resources set in the only tropical rainforest in the U.S. National Forest System. The CNF contains five endangered species including one of the ten most endangered birds in the world: the Puerto Rican Parrot (*Amazona vittata*). During the past 3 years the CNF has collaborated with USDA/APHIS Wildlife Services to reduce the impacts from two species of exotic rats. Since then research has been conducted by Dr. Desley Whisson and Ms. Jessica Quinn (University of California, Davis) in exotic species movements and control. The collaborative effort has provided the CNF with a more scientific and responsive exotic species control program. [POSTER]

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Jacoby Carter, USGS National Wetlands Research Center, 700 Cajundome Blvd., Lafayette, LA 70506 USA

The USGS Role in Nutria Research and Management

The USGS has been involved in nutria research for over 10 years. In the past studies focused on demonstrating and quantifying nutria contribution to marsh loss and post nutria marsh recovery, documenting life history parameters such as dispersal and survivorship and the development of quantitative models. Many of these projects have continued into the present. However, the USGS has developed new two new areas of research emphasis: population genetics and the development of new techniques for estimation of population and following nutria movement. The USGS has played an important role in coordinating nutria research and fostering communication between the research and management communities.

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Desley Whisson, Department of Wildlife, Fish and Conservation Biology, University of California, One Shields Ave, Davis, CA 95616 USA; Bernice Constantin, USDA/APHIS, Wildlife Services, 2820 E. University Ave. Gainesville, FL 32641 USA; Richard Engeman, USDA/APHIS National Wildlife Research Center, 4101 Laporte Ave, Fort Collins, CO 80521-2154 USA; Felipe Cano, USDA Caribbean National Forest, HC01 PO Box 13490, Rio Grande 00745-9625 Puerto Rico

Controlling Roof Rats (*Rattus rattus*) for Protection of Puerto Rican Parrots

Roof rats (*Rattus rattus*) are common throughout the USDA Caribbean National Forest (CNF), Puerto Rico, with trap success as high as 64% recorded in some locations. Consequently, rats pose a significant threat to nesting Puerto Rican Parrots (*Amazona vittata*), one of the ten most endangered birds in the world. Until recently, rat control at parrot nest trees in the CNF involved placing one or 2

bait stations containing 0.005% diphacinone bait near the base of the tree. This strategy has likely had little impact on rat populations and their activities at parrot nests. Furthermore, evidence of rats inside failed nests confirms the need for a more effective rat control strategy. In 2002, we conducted a study to determine the effectiveness and cost of implementing a more intensive baiting strategy around known nest trees immediately prior to and during the parrot nesting period. We monitored radio-collared rats and recorded bait consumption from bait stations to determine the effectiveness of a grid of 18 bait stations containing 0.005% diphacinone bait spaced at 40-m intervals and centered on the nest tree. All radio-collared rats were dead within 2 weeks and trap success was extremely low after a 3-week baiting period. The baiting strategy was therefore implemented at other nest trees where rats had been identified as a potential cause of unsuccessful nesting attempts in the past. Fledging rates were higher in 2003 than in previous years with no nest failures attributed to rats. Our study indicates that rat control is a highly cost-effective tool to apply in the Puerto Rican parrot recovery program.

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Dave Cowan, Ged Kerins, Mark Lambert, Alan Macnicoll and Roger Quay, Central Science Laboratory, Sand Hutton, York YO41 1LZ United Kingdom

Anticoagulant Resistance in Farm Rat Populations in the UK: Implications for Management and Environmental Impact

The opportunistic and invasive Norway rat (*Rattus norvegicus*) thrives in and around farm buildings in the UK. Consequent damage to stored food, damage to structures and zoonotic disease risks necessitates management action. The main management tools are rodenticide baits with anticoagulant use becoming the first, last and only resort for many. The extensive use of such materials has driven selection favouring physiological resistance. Surveys of farm rat populations have revealed widespread resistance to warfarin, and by inference other first-generation anticoagulants. Warfarin-resistant rats are essentially warfarin “proof” in that they are unlikely to be able to eat sufficient bait to ingest a lethal dose of under field conditions. Reports of resistance to second-generation anticoagulants arose shortly after their introduction in the 1970s. Initially this reflected only low-degree resistance where, under favourable field conditions, resistant animals might reasonably be expected to ingest a lethal dose. In recent years, however, populations have been identified with high prevalence of high-degree resistance to one or more second-generation anticoagulants. Here we report on the responses of such populations to the use of second-generation anticoagulant and non-anticoagulant rodenticides. In particular, we focus on the resistance status of populations as they recover from control, which we interpret in terms of the expression of pleiotropic costs, notably a raised requirement for vitamin K and reduced growth rate. Such costs may constrain the spread of resistance. There is, however, some evidence that such costs may no longer be associated with certain resistant traits. This has important implications for the long-term management of populations with high resistance prevalence and the environmental safety of rodenticide use against such populations.

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Phil Cowan, Landcare Research, Private Bag 11052, Palmerston North, New Zealand
[Presented by Penny Fisher]

Invasive Rodent Research Priorities in New Zealand

New Zealand has no native rodents but 4 introduced species, *Rattus norvegicus*, *R. rattus*, *R. exulans* and *Mus musculus*. *R. exulans* (kiore) was introduced by the original Maori settlers whereas the others were brought by European migrants in the 19th century. Rodent problems in urban areas and in crops are largely of nuisance value, but the suite of introduced rodents is a major threat to New Zealand’s indigenous biota. They prey on native birds and invertebrates, impact on forest processes through seed predation, and are primary prey for introduced carnivores, such as stoats, ferrets and feral cats, that also are significant predators of native animals.

A recent meeting of researchers and management agencies identified priorities for research on biology and control of rodents in New Zealand, including eradication of rodents from offshore islands. Priorities for research on the ecological role of rodents and their impacts, and rodent control strategies and tactics will be presented, and the concept of a rodent pest network discussed.

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Chris P. Dionigi, USDI, OS/SIO/NISC, 1849 C Street, NW, Washington D.C. 20240 USA

The National Invasive Species Council: An Update

In 1999, the National Invasive Species Council (NISC) was established by the U.S. Presidential Executive Order 13112. The NISC helps ensure that federal invasive species activities are coordinated and complementary. The NISC is co-chaired by the U.S. Secretaries of Agriculture, Interior, and Commerce and includes the Secretaries of Transportation, Homeland Security, State, Defense, Treasury, Health and Human Services, the Administrator of the U.S. Environmental Protection Agency, and the Director of the U.S. Agency for International Development. Invasive species harm the economy, the environment and sometimes, animal and human health. They can be found in every region in the U.S. and around the world. The Asian longhorn beetle, sudden oak death, and emerald ash borer have the potential to destroy entire forest ecosystems. Other examples include the now infamous snakehead fish, zebra mussel, brown tree snake, Asian carp, yellow star thistle, tamarisk, nutria and pathogens such as West Nile virus. Invasive species are the second leading cause--after habitat loss--of species being listed as endangered or threatened. They do not respect borders and cause severe problems that are local, regional, national and global in scope. Problems associated with invasive species are accelerating due to increases in trade, travel and tourism. In the U.S., it is estimated that invasive species cost the U.S. economy about \$100 billion per year.

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Integrated Pest Management in the U.S. National Park Service and U.S. Fish and Wildlife Service

The National Park Service (NPS) and Fish and Wildlife Service (FWS) are resource management agencies in the Department of the Interior (DOI). We have numerous needs for managing rodents on our lands including endangered species protection, eradication of invasive species, human health, concessionaires, and building maintenance. Management of pests by NPS and FWS is guided by DOI and agency policies. We briefly will review these policies as they relate to rodents and discuss the basic 11-step approach to integrated pest management in NPS and FWS.

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Peter Dunlevy, USDI/FWS Alaska Maritime NWR, 95 Sterling Highway, Suite 1, Homer, AK 99603-7473 USA

Addressing the Invasive Rodent Issue on Alaska Maritime National Wildlife Refuge

A program has been initiated on the U.S. Alaska Maritime NWR to address the serious threat invasive rodents pose to the important natural resources on the Refuge. The program is designed to accomplish the necessary planning, surveys, prevention measures, studies and outreach that will set the stage for a comprehensive Invasive Rodent Program on the Refuge for the next 20-30 years. The primary purpose of the program is to restore and conserve native ecosystems on Alaska Maritime NWR by preventing further introductions of invasive rodents and by removing invasive rodents from Refuge islands where they have become established.

Major elements include: National Environmental Policy Act (NEPA) compliance, appropriate federal and state rodenticide registrations, inventory invasive rodents within the Refuge, invasive rodent quarantine measures, test eradication and monitoring methods, assess nontarget hazards, document recovery and public outreach. This presentation will describe the program and planning as well as briefly highlight accomplishments to date.

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Steve Ebbert, USDI/FWS Alaska Maritime NWR, 95 Sterling Highway, Suite 1, Homer, AK 99603-7473 USA

Planning for Eradication of Arctic Ground Squirrels on Selected Islands within the Alaska Maritime National Wildlife Refuge

The U.S. Alaska Maritime National Wildlife Refuge has successfully eradicated non-native foxes from over 40 islands, cattle from two islands, and reindeer from one island. Planning for invasive rodent eradication began on the refuge began in 2002 with emphasis on Norway rats. Arctic ground squirrels (another invasive rodent) are established on about one dozen smaller refuge islands. Currently there are no toxicants registered for use against arctic ground squirrels in Alaska. The refuge is in initial stages in planning for ground squirrel eradication. Potential eradication strategies for this project will be presented.

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Peter J. Egan, Armed Forces Pest Management Board, Forest Glen Section – WRAMC, Washington, D.C. 20307-5001 USA

Department of Defense (DoD) Rodent Control

Historically DoD has controlled rodent pests to protect human health, food, and fiber. Rodents have assumed a different role in recent years as a food resource for brown tree snakes and as predators on endangered species. Prey reduction and protection of endangered species will require new tools for controlling these emerging problems.

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John D. Eisemann, USDA/APHIS Wildlife Services, National Wildlife Research Center, 4101 Laporte Avenue, Fort Collins, CO 80521-2154 USA

Registration Status of Two Anticoagulant Products for Eradicating Rodents from Islands and Derelict Vessels

In 2001, the USDI Fish and Wildlife Service entered into a cooperative agreement with the National Wildlife Research Center (NWRC) to work towards securing two rodenticide registrations from the U.S. Environmental Protection Agency for eradicating invasive rodents from islands and derelict vessels. Pesticide registration staff from the NWRC are been working with two private pesticide manufacturers to obtain registrations for brodifacoum and diphacinone products. The intent of these rodenticide registrations is to rid islands of introduced rodent predators for the protection of native flora and fauna. Additionally, the project aims at stopping new rodent invasions potentially arising when ships ground on islands. Since eradication is the goal of predator control on islands, the labels are written with enough flexibility to provide the maximum chance of total eradication. As proposed, these registrations would allow rodenticide application by aerial and hand broadcast methods or through the use of bait stations, burrow baiting or canopy baiting. The registration applications for these products are expected to be submitted to the U.S. EPA prior to the 2nd National Invasive Rodent Summit.

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